REMARKS

Claims 1, 7-9 and 16 have been amended in order to more particularly point out and distinctly claim the subject matter that Applicants regard as the invention.

Claim Rejections - 35 U.S.C. §102:

Claims 1-16 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,986,301 to Fukushima et al.

Applicants herein amend claims 1, 7-9 and 16, and Applicants subsequently respectfully disagree with the above rejection, because not all of the claimed limitations are taught by the cited reference.

Applicants initially note that in the present invention, at least one of a first electrode 32 and a second electrode 40 is an electrode of a base metal, and an intermediate layer 34, 38 is formed between the electrode 32, 40 of the base metal and a ferroelectric film 36 (see Figs. A, B and C in attached Differences Between Present Invention and Cited Reference). The base metal is a material that is not self-aligned easily. Therefore, if the ferroelectric film 36 is formed in contact with the electrode 32, 40 of base metal, crystal directions of the ferroelectric film 36 are not aligned easily. Accordingly, if the ferroelectric film 36 is formed in contact with the electrode 32, 40 of the base metal, it is difficult to form the ferroelectric film 36 having good perovskite crystal structure. Furthermore, oxygen, etc. in the ferroelectric film 36 tends to be diffused in the electrode 32, 40 of the base metal. In the present invention, since the intermediate layer 34, 38 of perovskite crystal structure is formed between the electrode 32, 40 of the base metal and ferroelectric film 36, it is

possible to form the ferroelectric film 36 having good perovskite crystal structure, even in the case that the base metal is used as the material of the electrode 32, 40.

On the other hand, Applicants note that in Fukushima et al., an intermediate layer is not formed between a dielectric thin film 243 and an electrode 242, 244 (see Figs. D, E and F in the attached paper). In Fukushima et al., if the base metal is used as the material of the electrode 242, 244, oxygen in the dielectric thin film 243 is diffused into the electrode 242, 244, and the electrode 242, 244 is oxidized by oxygen, because the intermediate layer is not formed between the electrode 242, 244 and the dielectric thin film 243. Furthermore, in Fukushima et al., if the base metal issued as the material of the electrode, hydrogen (H_2O) in the outside is entered into the dielectric thin film 243, because the intermediate layer is not formed between the electrode 242, 244 and the dielectric thin film 243. Therefore, in Fukushima et al., if the base metal is used as the material of the electrode 242, 244, it is impossible to form the ferroelectric film having good perovskite crystal structure.

Furthermore, Applicants note that in the present invention, both the first electrode and the second electrode are made of metals (see Figs. A, B and C in the attached Differences Between Present Invention and Cited Reference).

Conversely, in Fukushima et al., the first electrode 242 and the second electrode 244 are made of electric conductive oxide materials having a perovskite crystal structure (see Fig. D in the attached paper). Fukushima et al. discloses that one of the electrodes 242, 244 may be made of a refractory metal (column 4, lines 35-40). However, in Fukushima et al., the other of the electrodes 242, 244 must be made of the electric conductive oxide material having a perovskite crystal structure

(see Figs. E and F in the attached Differences Between Present Invention and Cited Reference). In Fukushima et al., if both of the electrodes 242, 244 are made of the metals, it is impossible to reduce a leakage current, and it is impossible to obtain a high dielectric constant.

In view of the aforementioned amendments and accompanying remarks and for at least the above reasons, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees that may be due with respect to this paper to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Version with Markings to Show Changes Made
Attachment A: Differences Between Present Invention and Cited Reference

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please cancel claims 4-6 without prejudice or disclaimer.

Please amend claims 1, 7-9 and 16 as follows:

1. (Twice Amended) A semiconductor device comprising a first electrode of a metal, a ferroelectric film formed above the first electrode, and a second electrode of a metal formed above the ferroelectric film, at least one of the first electrode and the second electrode being an electrode of a base metal, further comprising

an intermediate layer of perovskite crystal structure formed ~~at least one of boundary~~ between the ~~first~~ electrode of the base metal and the ferroelectric film, ~~and boundary between the ferroelectric film and the second electrode,~~ materials of the intermediate layer being different from materials of the first electrode, the second electrode and the ferroelectric film.

7. (Amended) A semiconductor device according to ~~claim 4~~ claim 1, wherein the base metal is Ni, Cu or Cr.

8. (Amended) A semiconductor device according to ~~claim 5~~ claim 2, wherein the base metal is Ni, Cu or Cr.

9. (Amended) A semiconductor device according to ~~claim 6~~ claim 3, wherein the base metal is Ni, Cu or Cr.

16. (Twice Amended) A semiconductor device comprising a capacitor including a first electrode of a metal, a ferroelectric film formed above the first electrode, and a second electrode of a metal formed above the ferroelectric film; at least one of the first electrode and the second electrode being an electrode of a base metal, and a transistor connected to the first electrode or the second electrode, further comprising

an intermediate layer of perovskite crystal structure formed between the electrode of the base metal and the ferroelectric film, ~~and boundary between the ferroelectric film and the second electrode,~~ materials of the intermediate layer being different from materials of the first electrode, the second electrode and the ferroelectric film.

ATTACHMENT A

DIFFERENCES BETWEEN PRESENT INVENTION AND CITED REFERENCE

Present Invention

FIG. A

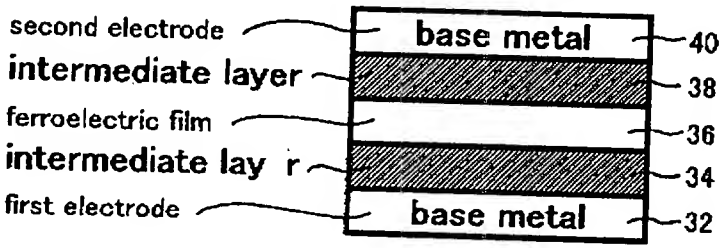


FIG. B

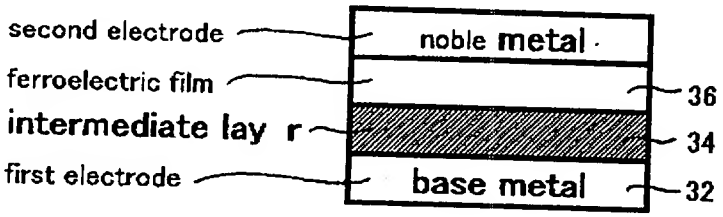
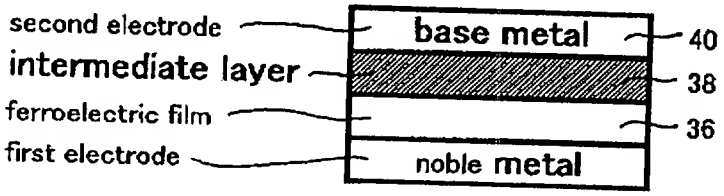


FIG. C



Fukushima et al.

FIG. D

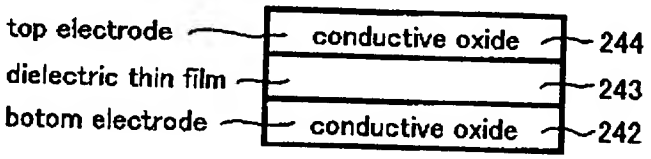


FIG. E

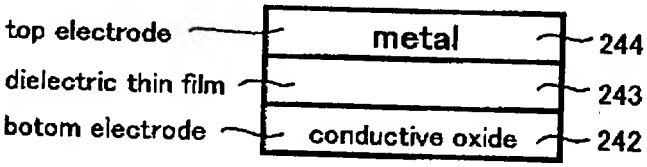


FIG. F